

Supplementing Traditional Ways Of Measuring Scholarly Impact: The Altmetrics Way

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The paper explores the importance of the Altmetric Attention Score (AAS) and York researchers' awareness and perceptions of scholarly metrics and their impact.

The top 100 papers with high Altmetric Attention Scores from York University were downloaded using Altmeter Explorer. These articles were further sorted by year of publication, subject areas, and the journals they were published in. Faculty members across disciplines were informed about their AAS along with the Google Scholar citations to the same article. They were requested to complete an online survey. Faculty members were interested in knowing more about the News media coverage and the Altmetric Attention Scores for their other articles. They also wanted to know the applicability of these altmetrics to their research. Much work needs to be done by the administration and librarians to explain the importance of altmetrics in different fields and how they can support and enhance the university and the researcher's profile.

Introduction

Demonstrating Impact has been the buzzword in many North American universities including York University.¹ In recent times, scholarly impact needs to be demonstrated by our academia to get tenure and to secure the limited research funds from granting agencies. This scholarly impact is also captured and by the university administration to show value to its shareholders including potential students and the provincial government.² It can also be used to emphasize the university's value and commitment to teaching and research and is seen as an effective promotion and marketing tool.

York University, a multidisciplinary University located in Toronto, Ontario, Canada has an online Newsletter (YFile) with a section that highlights new research and emerging researchers at York.³ It is an openly accessible and can showcase a very minuscule part of the research done at York. At the same time, the York University Promotion & Communication team is responsible for liaising with News agencies and publicizing some of these research impact stories. In the recent past, there have been many researchers and graduate students from York University who have been mentioned in News Media across the world, their research papers gets cited in Wikipedia and Policy documents and they are also a part of the conversation on blogs managed by reputed organizations and credible researchers. None of this gets captured or is considered as scholarly impact. The research faculty at York continues to make innovative advances in pure and applied sciences and yet the attention, till date, has been focused on citation metrics and journal impact factor.

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This work on altmetrics and its role in supplementing traditional ways of measuring scholarly impact was prompted by the above-mentioned reasons as well as by the York University Academic Plan 2015–2020.⁴ There has been an ongoing discussion in the York University Senate about relevant performance indicators.

In the coming years, the focus will be to capture the different avenues where York research is being discussed and enhance ways to articulate the full range of scholarly impact. This will hold true for many of the North American universities. Researchers and tenure committees are looking beyond impact factors and they are hungry for more diverse and nuanced metrics.⁵

Altmetrics to the Rescue?

Priem et al⁶ proposed the term altmetrics to capture the measure of a paper's impact—including the number of times it had been viewed, mentioned in blogs, Twitter or Facebook posts, saved by Mendeley users, had been covered in News sources, referenced in Wikipedia or Policy documents among others. This diversity of online discussions could, in a way, signify the aggregate impact of research in the public and societal realm. Some companies that offer services to track these measures include Altmetric, Impactstory and Plum Analytics. Many journal publishers also display similar statistics for their articles.

Altmetric (Organization) defines altmetrics/alternative metrics as data sourced from the web that indicates both the volume and nature of attention that research receives online.⁷ Altmetrics are complementary to citation-based metrics, and distinct from social media metrics (which don't measure the attention paid specifically to research online) and usage statistics (which showcase only the volume of attention research has received). Altmetrics are very much intended to complement traditional scholarly metrics, such as citations, to provide a more complete picture of the reach and potential broader impacts of a piece of research. Citations to articles reflect the scholarly influence of the work, whereas altmetrics can help readers understand how it has been received and interpreted amongst a much broader audience—for example amongst policy makers, practitioners, and the general public.⁸ Altmetrics can be regarded as an indicator of engagement and a real-time record of the online attention surrounding an individual research output.

Objectives of this Study

The study was done to inform our science and health science faculty about altmetrics for their research papers. Some of the objectives while undertaking this work were,

- Investigate if Altmetric Explorer could be used to identify research papers from York University (YU) with high Altmetric Attention Scores (AAS)
- Inform YU faculty about their papers with high AAS while explaining these alternative metrics
- Gauge faculty perceptions about altmetrics and traditional metrics

Kolahi and Khazaei conducted a PubMed search in specific years to find dental articles, which they later sent to Altmetric for further analysis. This was done to identify the top dental journals that had articles with high AAS.⁹

The author of this paper is not aware of any published literature that has used Altmetric Explorer to identify top papers from a multidisciplinary university and then asked faculty members about their perceptions of altmetrics and other research metrics.

For the purpose of this paper Altmetric with a capital “A” will be used to denote the organization *Altmetric*. Other alternatives to showing research impacts, besides traditional metrics, including mentions in News media outlets, Twitter mentions, Facebook posts, Mendeley saves are denoted as altmetrics (with small “a”) or as alternative metrics.

Method

The Altmetric Explorer is an intuitive platform that enables monitoring of online activity surrounding academic research. It allows input of custom specific searches including keywords, journals and specific identifiers like funders, DOIs including PubMed search syntax. Altmetric started assigning the Altmetric Attention Score by capturing social media mentions to published research articles from 2012 onwards. Altmetrics could include News media mentions, Blogs, Facebook and Twitter posts and links, Wikipedia references, mention in Policy Documents, F1000 and YouTube among others. All these mentions from these different sources contribute to a weighted Altmetric Attention Score.¹⁰

The Science Librarian contacted Altmetric and requested access to Altmetric Explorer. Altmetric Explorer was used to identify York University research articles with high AAS.

An affiliation search for York University was run in PubMed database. The same search string was conducted in the author's Altmetric Explorer account. This Altmetric Explorer search highlighted York University research papers that had very high AAS. The first hundred articles with high AAS were downloaded and further analyzed.

The papers downloaded in MS Excel were reconfirmed to be from York University. This was done using databases including PubMed, Scopus, Web of Science and Google Scholar. The first 100 articles were marked to indicate if they were open access or available only through a subscription-based journal. Further, the downloaded articles were color-coded to indicate whether they were open access either from the publishers' website, ResearchGate, PubMed Central, York Repository or could be read only through a subscription-based journal. The AAS for each of the article, mention in News media and the Google Scholar citations to each of them was noted.

A total of fifty-two unique York University authors were identified from the first 100 articles downloaded from Altmetric Explorer.

An online survey was created in SurveyMonkey (Appendix 1). The survey had questions related to scholarly metrics, faculty perceptions of altmetrics and questions on their use of new metrics and tools to promote research. The survey was kept open from 16th Dec 2016 to 13th of Jan 2017. E-mails were sent to the fifty-two unique York authors with general information about altmetrics, the Altmetric Attention Score and Google Scholar citations to their article (s), the weighted AAS, and instructions for downloading the Altmetric bookmarklet. The links to their AAS and Google Scholar citations for their paper(s) were also included in the email. Faculty members were requested to complete a short online survey about research metrics and their awareness of alternative metrics.

Twenty-eight authors had completed the survey at the time of writing this paper.

Results

Altmetric Attention Scores using PubMed affiliation search

After running the PubMed affiliation search in Altmetric Explorer, the AAS results were displayed in a descending order (year of publication). The colors within the Altmetric Attention Score (sometimes referred to as the doughnut) signify where these articles had been mentioned or discussed.

The first 100 articles with the highest Altmetric Attention Scores were analyzed in more details. These articles were arranged by the year of publication (from 2016-2009) and the number of times they were mentioned in news outlets and the citations they had garnered in Google Scholar. All this data was downloaded in Excel format.

Altmetric started tracking attention to research across their monitored attention sources at the beginning of 2012. A research output could have been published at any time (prior to 2012) and if it was discussed or shared after 2012, Altmetric would collect the mentions..

Of the first 100 articles with high AAS identified using the PubMed affiliation search, fifteen articles were published 2016 and thirty articles were identified in 2015 with another 30 in 2014 (Table 1). A significant number of articles were open access and were available either on the publishers' website or through repositories.

TABLE 1 Number of articles with high AAS (affiliation search in PubMed)		
Year	Total number of articles with High AAS (n=100)	Open access articles (in OA journal, ResearchGate, York Repository, PMC, PMCC, biorarxiv)
2016	15	10
2015	30	19
2014	30	27
2013	6	5
2012	9	8
2011-2009	9	9

A higher number of articles were available through PubMed Central and the university repository in the subsequent years. There was only one article in 2012 that was in a subscribed journal.

Altmetric Attention Score can help identify the highly discussed and publicized research. A detailed observation of the journal articles could provide more reasons as to why certain articles and journals were at the forefront (Table 2). It is rather difficult to summarize the reasons for high AAS in this paper. However, a brief explanation has been provided.

TABLE 2 Broad topics & Journals that were having a high AAS in specific years		
Year	Hot topics—based on high AAS	Top Journals
2016-2015	Ice-Loss—Climate change Secular differences—Calorie Intake—Weight Loss Antihydrogen Obesity—Diabetes—Physical activity Mars—Methane; Pluto—Ice Polar bears—Climate change—Conservation Honey bees, Bumble bees—Climate change, Bees—Genetics Brain plasticity—Expert Dancers Diabetes—Exercise Environmental factors—Autism Spectrum Disorders Pain Management Cardiac Rehabilitation Synchrony in shorebirds Environmental factors—Brain Lipids Fluoridated water—Attention Deficit Disorder Reducing Pain—Vaccination Injections	Nature (4) Science (2) PLoS One (2) Geophysical Research Letters Obesity Research & Clinical Practice European Journal of Neuroscience Biology Letters Diabetes Care Traffic Injury Prevention European Journal of Preventive Cardiology Canadian Medical Association Journal

TABLE 2 (CONTINUED)

Year	Hot topics—based on high AAS	Top Journals
2014–2013	Gravity—Balance—Vision Research Pediatric Emergency Jellification of Lakes—North America Forests—Fish Growth Inferring personality from avatars Musical Training Bilingualism Religious magnanimity Cardiac Rehabilitation Antihydrogen Stem Cells—Autism Spectrum Pharmaceutical Advertisements Honeybees-Genomics Text messaging using Vodka Conflicts of Interest—Canadian Medical Schools Brain-Personality-Behaviour	PLoS One (7) Proceedings of the Royal Society: Biology Personality & Psychology Bulletin Journal of Personality & Social Psychology British Medical Journal Pediatrics & Child Health Biology Letters PNAS Nature communications Cerebral Cortex Neuropsychologia
2012–2009	Pain management Unengaged mind-boredom Bilingualism—Mind & Brain— Dementia Prevention Charles Darwin: Early Biographies Narcissism—Self-Esteem-Facebook Food addiction—Obesity Social Cognition	Wiley Reviews: Cog. Science Persp. On Psychol. Sci. Trends in Cog. Sci. Appetite Notes & Records of the Royal Society Science, Nature Cyber Psychol. Behav. & Social Networking Cochrane Database of Systematic Reviews

Some of the research papers with high AAS were published in collaboration with international agencies like NASA or American Diabetes Association, or had secured national and international funding. There were also topics that were being discussed like Climate Change and its repercussion on flora and fauna, which had significant News media attention. Research from well-established research centres and had been profiled in York University's online newsletter. Other work including, Autism, Bilingualism & Dementia Prevention, had the stamp of esteemed researchers.

York University Libraries was also supporting Open Access (OA) Journals in 2013–2015 by paying the Article Processing Charges for PLoS One and other OA journals. PLoS One articles had a very high Altmetric Attention Score in 2013–14 and there were seven articles from PLoS One in that year. Certain high impact journals like Science, Nature, and PNAS found regular mention in all years. Most of the articles in these high Impact journals were made open access by the time of this study. However, there were a few articles from Science & Nature published in 2016 that were yet to be made OA.

After the Altmetric Explorer analysis faculty members were invited to complete the YU Research_Altmetric Attention Score survey (Appendix 1). Some of the responses are presented below.

Faculty Profile

A total of twenty-eight faculty members completed the online survey (survey response rate 54%).

Out of the twenty-eight, ten faculty members were from Psychology, five from Kinesiology, four from Biology and remaining were from departments including History, Neuroscience and Engineering. Of the twenty-

eight respondents, fourteen of them had substantial teaching and research experience (16 or more years) and the remaining had up to fifteen years experience. Faculty members were not asked to identify themselves by rank or tenure status, but based on the number of years of experience and the York Faculty directory one could assume that more than 85% of them were either Associate Professors or Full Professors.

Awareness of Research Metrics

Barring one faculty member, all faculty members were aware of at least one of the research metrics. Most of the respondents (n=26) had heard about Impact factor of the journal, twenty-four were aware of Google Scholar citations and H-index, and twenty-six knew about citation to articles. A fairly high number (n=16) were aware of Papers and Web of Science citations (n=22). Though fifteen respondents were aware of Scopus only one of them had heard about Scimago Journal and Country rank.

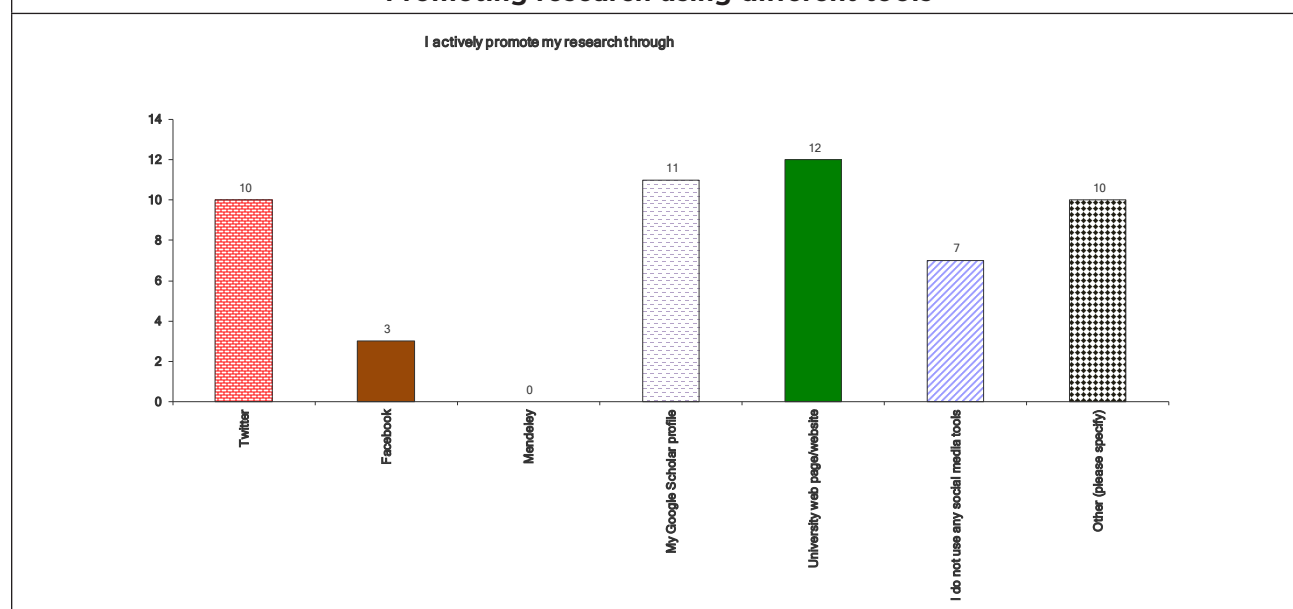
Not surprisingly very few faculty members had heard about alternative metrics / altmetrics (n=12). Two respondents mentioned about ResearchGate and that they used it for monitoring downloads and views to research articles.

Monitoring & promoting research using social media tools

A total of seven respondents said that they monitored citations and metrics to their article(s) at least once a week or once in a fortnight, whereas twelve replied that they did not monitor research metrics for their articles actively. Ten respondents of the twelve, who did not monitor citations actively, were aware of Impact Factor of Journal and citations to articles as research metrics. Eight of the twelve were aware of Google Scholar H-index and six were aware of Web of Science and metrics offered by this database. Of the twelve who did not monitor research metrics to their articles very actively, eight had sixteen or more years of teaching and research experience and two had less than ten years experience.

Some of them clarified that they monitored research metrics “at the time of preparing grants—approx. once every 4 years” while another commented “inconsistent, and usually only when there is an upcoming funding and / or award application”.

FIGURE 1
Promoting research using different tools



Yearly when i have to submit performance summaries for cross-appointments or when i am writing grants and have to summarize my contributions

Faculty Member

Promoting their research

Eleven respondents mentioned that they had created a Google Scholar profile with their papers linked through this channel. Five of those eleven, who had Google Scholar profiles, also posted their research on the university web page and four (of the eleven) promoted their research through Twitter. None of the eleven used Facebook to highlight their research. Only four of the eleven were aware of the Altmetric Attention Score to their article(s) prior to the librarians e-mail (Figure 1).

Ten other faculty members promoted their research through Twitter and three also mentioned Facebook as a means of promotion. Others used ResearchGate, Academia.edu, personal website, university press releases and one faculty maintained the Faculty research listserv and posted links to all faculty research on this listserv (n=10).

Of the ten who said that they promoted their research through Twitter, five had less than ten years teaching and research experience, while four had sixteen or more years of experience. A total of seven faculty members did not use any social media tools for research promotion. They were from different departments including Biology, Health Policy, Psychology, Kinesiology and Astronomy and Astrophysics. Of the seven who do not use any social media, five had sixteen or more years of teaching and research experience and did not monitor research metrics to their articles very actively.

Awareness of alternative metrics to their articles

Faculty members were also asked if they were aware about altmetrics (including the AAS) for their article (s) prior to the librarian's e-mail. Of the twenty-eight, eighteen replied that they were not aware of the AAS to their article.

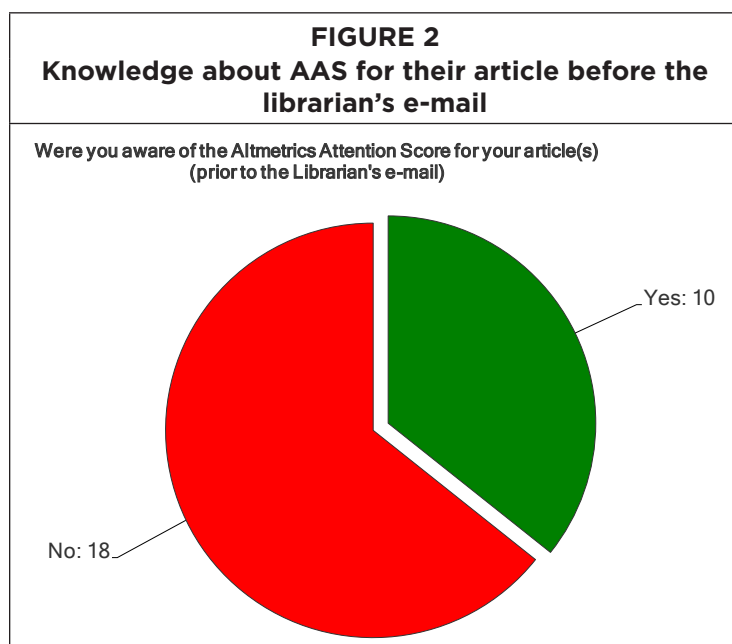
In response to the question about whether they were aware if their article with high AAS was Open Access, thirteen knew that it was open-access; eleven said that it was not OA and six were not sure (Figure 2).

It is very difficult for authors to keep track whether the article was made open access after initial embargo period, based on funding agencies requirements. It is also possible that one of the other researchers made the article available in their university repository or through ResearchGate or similar repository.

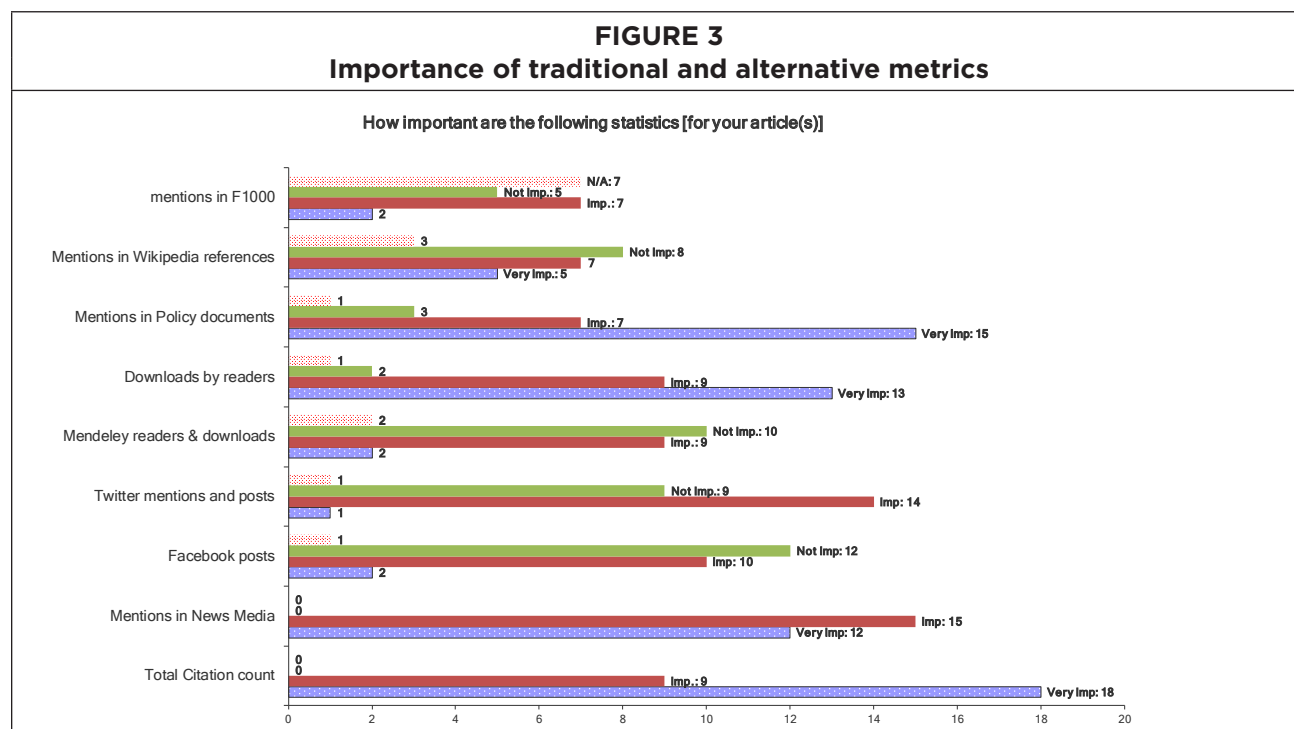
The Science Librarian found that many of the articles that were initially not open access but became open after a few months. They were openly available through PubMed Central or the publishers website and other sources listed above.

Metrics and their statistics

A total of twenty-seven respondents said that statistics for total citation counts were either very important or important for their article(s). An equal number mentioned coverage of their research in News media stories as very important / important statistics. Twenty-



two of them said that download statistics of their article(s) were very important/ important. Another measure considered to be Very important/important was Mentions in Policy documents (n=22). Of a little lesser importance were Twitter Mentions of their articles—twenty-five of those who replied, fourteen considered it to be important (Figure 3).



Of the twelve who mentioned that they did not monitor research metrics actively, eleven replied to the question—“How Important are the following statistics, for their articles”. All eleven respondents deemed *Total citation count* and *Mention in News media* to be very important / important statistics. Nine of the twelve considered *Mention in Policy documents* and *Downloads by readers* as very important/important. Five of them considered altmetrics to be very important/important statistics for tenure and promotion and grant applications.

Of the eleven, one of them was “gratified” to have a tool to quantify the impact of research since the “h-index can be very misleading” while another respondent attributed not paying attention to statistics for research articles to the faculty member’s age and said “...I don’t really pay any attention to it. Sorry, I’m probably just too old!”

From the open comments it was inferred that some of the faculty members have had to submit metrics including H-index, Altmetric Attention Score and total citation counts to articles while applying for research funding to external grant agencies.

I have applied for private foundation applications that explicitly ask for Web of Science H-index and peak AAS.

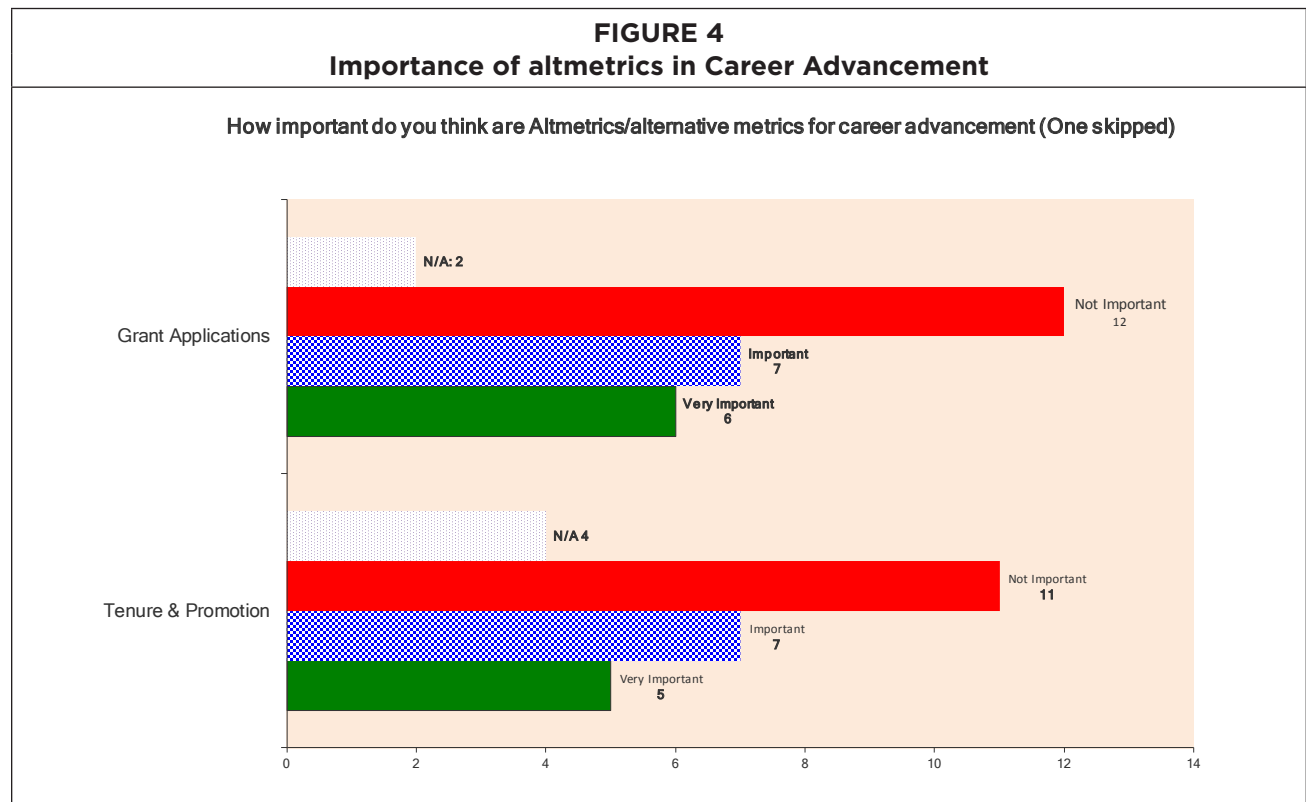
Survey respondent

Another multiple-choice question asked respondents to select all research metrics they wanted to know more about. Of the eighteen who replied to this question, thirteen mentioned that they would be interested in

knowing more about altmetrics and AAS, ten wanted to know more about news media mentions and seven also wanted more information on Social Activity Online.

Altmetrics & Career Advancement

When asked about the importance of altmetrics in career advancement, almost half of those who responded said that alternative metrics were very important to important with respect to tenure and promotion and securing grants.



Twelve respondents deemed altmetrics to be either very important to important for tenure and promotion while a total of eleven thought alternative metrics to be either be very important or important while applying for grants. However, there were almost an equal number of respondents who did not consider altmetrics to be important for career advancement either in tenure and promotion or while applying for grants (Figure 4).

I think these things will become more important...but I am ambivalent about them and unsure what exactly they mean about uptake/relevance of my work etc

While most of the faculty considered scholarly metrics to be important for their work at least one faculty member felt that some metrics were being misinterpreted and misapplied across the board. As correctly pointed out by the same faculty member, Impact factor should not have been used to judge an individual. According to the researcher, some of these metrics had driven “terrible publishing practices” and that scholarly metrics had “taken far too great an importance in tenure and promotion decisions”. There were other comments that could be subject to more discussion. Another faculty member commented that the answer to the survey question re-

garding the importance of altmetrics to career advancement was based on the departmental thoughts and policies but the respondent had different views that were not elaborated in the survey.

Altmetrics is a very new field of identifying impact in non-traditional sources. It may definitely have role to play in the coming years, however it is rather early to say how these metrics will be applied across academia and subjects.

Discussions

After the survey, the Science Librarian has had many conversations and e-mail exchanges with faculty on altmetrics and Altmetric attention score. Some of the faculty members had just heard about altmetrics at conferences and then they received the e-mail from the librarian about the AAS to their articles. Needless to say, they were pleased and had been eager to complete the survey.

I appreciate that the librarians teach us how us faculty can determine the impact of our work in these traditional and non-traditional ways

Survey respondent

Another faculty member wanted to know how altmetrics could be used in promoting oneself and if there was an Altmetric Attention Score for an individual researcher based on all the previously published work. After this study, York faculty members have been informing co-authors from other universities about the high AAS. Some had downloaded the Altmetric bookmarklet to keep track of subsequent news mentions to their other articles.

Some of the more recent papers published within the last three years (2016 to 2014) had high Altmetric Attention Scores as compared to Google Scholar citations. This would be as per expectations and research papers published from prior to 2014 had amassed higher Google Scholar citations.

Limitations: One of the limitations of the study was that the author surveyed a selective audience. York University articles that had an Altmetric Attention Scores were analysed and those faculty members were invited to the online survey. This was necessary to get the initial thoughts of researchers who would be interested in completing the survey. Another possibility is that not all searches may have been captured by the PubMed search strategy.

AAS brings forth a different set of papers and may help in highlighting the uniqueness of a university's research that is already being discussed in the wider community.

In order to prevent altmetrics taking the impact factor route or becoming another set of management statistics, it is important for librarians to talk with faculty. This score promotes research visibility and needs to be considered in the proper context.

More information needs to be provided to our faculty about the Altmetric Attention Score and how it is calculated. This new form of highlighting scholarly impact should not end up as an assessment measure and as a means to compare individuals and departments.

This has been a concern expressed by some faculty at other universities. Academia in Loughborough University needed clarity on how the institution proposed to use altmetrics and ways researchers could engage with this tool.¹¹ Brochardt and Roemer make a valid point when they say that researchers and administrators are wary of the growing momentum behind next-generation metrics. They found it to be particularly true with faculty who were not very comfortable with online environment and products.¹²

How any of these measures (including citations) are interpreted and used depends on the aims of the individual researcher—for example if the objective was to increase public understanding of a certain topic then metrics that showed a lot of public engagement on social media along with news media coverage and references

from Wikipedia would convey the message. In most cases, all research metrics (altmetrics, citations, downloads etc) can be regarded as indicators—they are a way of identifying potential research directions that may be discussed across different communication channels.

Conclusion

Altmetrics can sometimes indicate potential impact and research trends within the university. When examining the top articles from PubMed, it was easy to identify the top areas that had garnered high attention including specific research that was being discussed in News media. Many of our faculty members indicated in the survey and in personal communications with the librarian that the Altmetric Attention Score mattered to them. After completing the survey, some of them wanted to know if the Libraries were subscribing to Altmetric Explorer for Institutions.

Very recently the News Media Communications personnel at York University had organized a talk on the role of media—News and Social media—in promoting York University research. This workshop had a lot of traction and was well attended by Science, Health Science and Business faculty. Science & Health Science faculty members mentioned about their AAS and how they had started including it in their grant applications to highlight their work. Biology faculty members conducted a workshop on tips for promoting research using Twitter.

Academic librarians need to fully understand the importance of these altmetrics and may want to have early conversations with their constituents. New faculty members at York University have found these Attention scores important especially since they provided wider news media coverage of their research. Very few researchers get mentioned in York's online newsletter. There is always competition for space and yet there are many other places where the research is being discussed. Academic librarians are uniquely positioned to make our faculty and students aware of these new metrics and how it can play to their advantage.

Altmetrics can definitely supplement traditional citations and it is possible that they will play a bigger role in showcasing research impact. Going forward, tools like Altmetric Explorer need to be better integrated with the free databases and publisher platforms. It is crucial that these tools capture the diverse sources where research is being discussed while also explaining its relevance. It is likely that altmetrics will find an accepting audience especially amongst those who have questioned traditional citation metrics including the much misunderstood journal impact factor.

Notes

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